April 8, 1930. W. F. BUTLER 1,753,548

SALT FILLING MACHINE

Filed Feb. 8, 1922 4 Sheets-Sheet 1

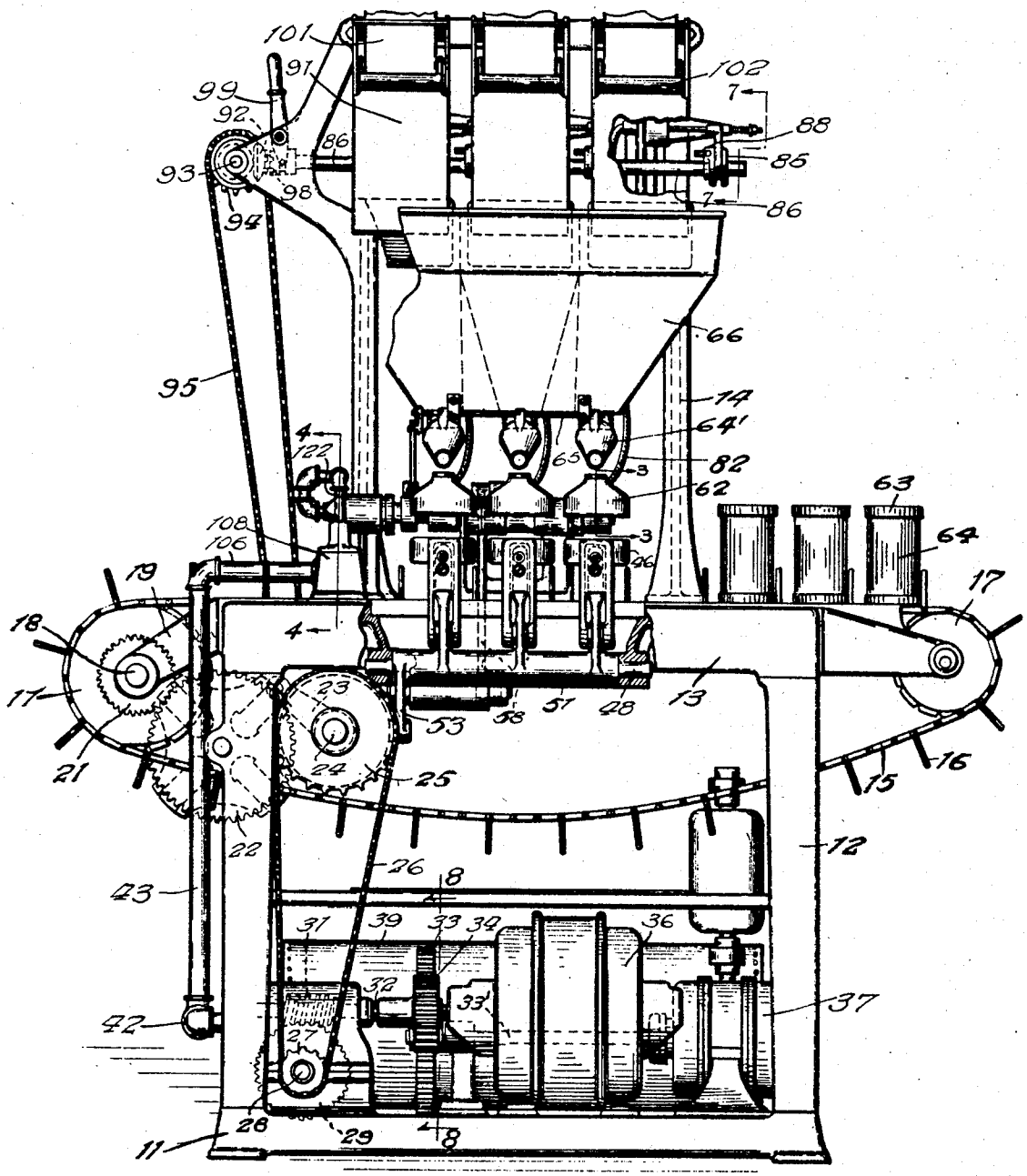


Fig. 1

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Fig. 2a.

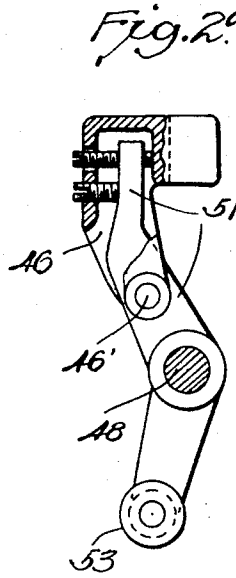
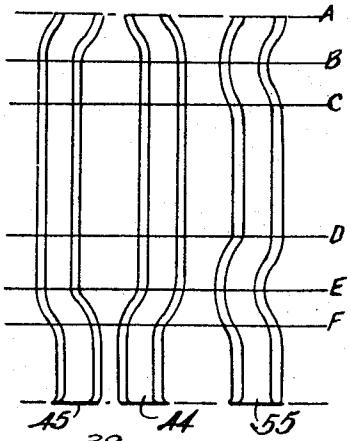


Fig. 2

Fig. 9.



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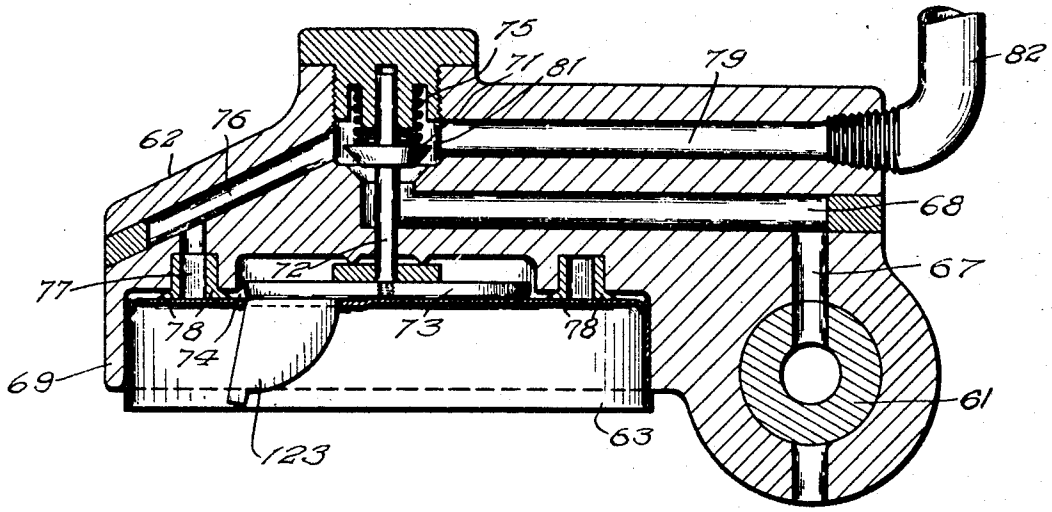


Fig. 3

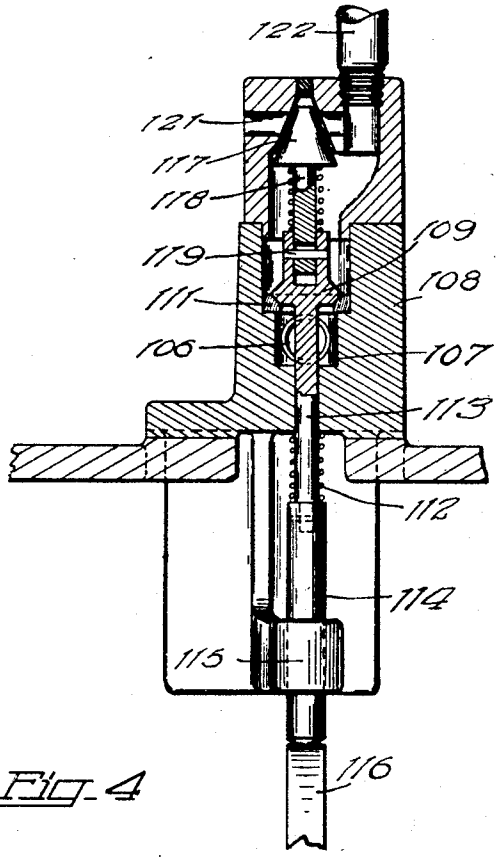


Fig. 4

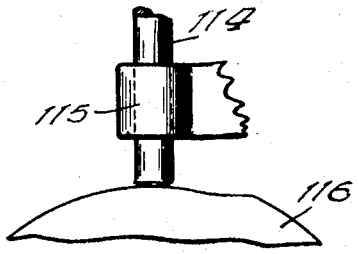


Fig. 5

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SALT FILLING MACHINE

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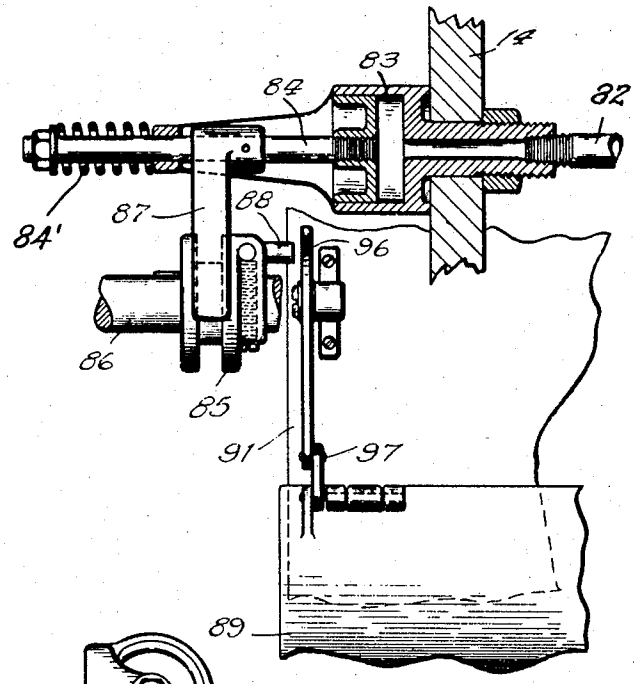


Fig. 6

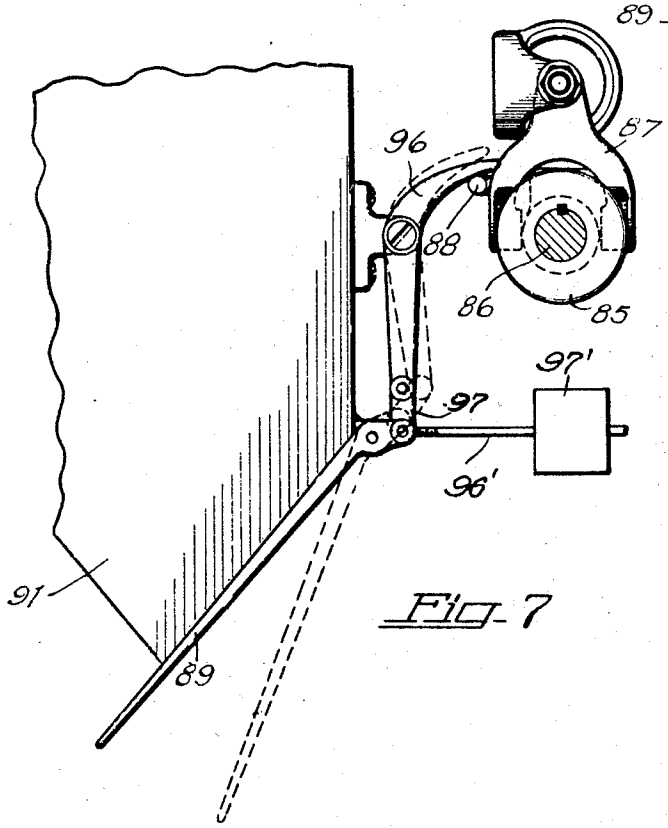
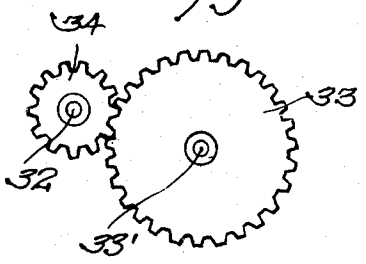


Fig. 7

Fig. 8.



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Patented Apr. 8, 1930 1,753,548

UNITED STATES PATENT OFFICE

WILLIAM F. BUTLER, OF HILLSIDE, NEW JERSEY, ASSIGNOR TO AMERICAN CAN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY

SALT-FILLING MACHINE

Application filed February 8, 1922. Serial No. 534,902.

This invention relates in general to can filling machines, and more particularly to such machines adapted for the packaging of salt or other granular material.

Salt is commonly packed in fibre containers provided in one end with a metal pouring spout, and, in accordance with the usual method of packing, the salt is introduced through the restricted opening of the pouring spout after both the top and bottom are secured in place. This results in unduly prolonging the operation of filling because of the necessarily small size of the opening and the special spout construction. It is a principal object of the present invention to provide an improved apparatus and method for filling containers of this character whereby the foregoing difficulty is eliminated, and the containers quickly filled by automatically removing a loose top, introducing the contents through the open end and replacing the top upon the filled container.

A further object of the invention is the provision of apparatus whereby a plurality of containers may be simultaneously filled in the manner above indicated, the invention contemplating in this regard the provision of an intermittent can feed operating in timed relationship with respect to a number of holding and material feeding devices acting during the period of rest of the can feeding mechanism.

Another important object of the invention is the provision of automatic means for decapping the empty containers, which mechanism operates in conjunction and in proper timed relationship with respect to the feeding devices, the latter, for this purpose, being controlled by the action of the former. The invention contemplates in this connection the prevention of operation of the filling device when no can is present beneath the cover mechanism.

A specific object of the invention is the provision of a vacuum control for both the decapping and filling devices, and means for breaking the vacuum and restoring normal air pressure in the controller parts when it is desired to replace the covers and cut off the feeding mechanisms.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings,

Figure 1 is a side elevation of a machine in which my invention is embodied, certain parts thereof being shown in section for convenience of illustration;

Fig. 2 is an end elevation of the machine;

Fig. 2^a is a fragmental detail of one of the holding jaws for the container;

Fig. 3 is a greatly enlarged sectional view taken substantially on the line 3—3 in Fig. 1;

Fig. 4 is an enlarged sectional view taken substantially on the line 4—4 in Fig. 1, certain of the parts being broken away for better understanding of the constructions;

Fig. 5 is a partial side elevation of the valve stem and its actuating cam, shown at the bottom of Fig. 4;

Fig. 6 is an enlarged view, partially in section and partially in side elevation, of the feed controlling mechanism, being taken substantially on the line 6—6 in Fig. 2;

Fig. 7 is an end elevation of the parts shown in Fig. 6, being taken on the line 7—7 in Fig. 1;

Fig. 8 is an end elevation illustrating part of the gearing;

Fig. 9 is a diagrammatic view illustrating the complete circumferential developments of cams 44, 45 and 55, the view illustrating the relationship of the parts of the cams to one another.

The machine illustrated in the drawing is supported upon a base 11 and is mounted upon a main frame 12, a table support 13 and an upper auxiliary frame or yoke support 14.

A conveyor chain 15, moving intermittently, is provided with lugs or flights 16, extends over an idler sprocket 17 and is driven across the table support 13 by means of a sprocket wheel 17′, which is mounted upon a shaft 18, the latter being mounted in a bracket 19 and driven through a gear 21 meshing with a Geneva gear 22. By this means the containers are moved in a defined path with inter-

vals of rest. The Geneva gear 22 is driven in the well known intermittent manner by an arm 23 mounted upon a shaft 24, which shaft carries also a sprocket wheel 25 driven by a chain 26 which extends about a small sprocket 27 mounted upon a parallel shaft 28. Said shaft 28 carries also a worm wheel 29 which is driven by a worm 31 mounted upon a horizontal shaft 32, which is the rotary shaft of a motor 36 forming the prime mover of the operative parts of the machine. Said shaft 32 carries a pinion 34 which meshes with a large gear 33, (see Fig. 8) secured to a horizontal pump shaft 33′ of a vacuum pump 37 communicably connected by a pipe 38 with a tank 39 at the back of the machine. The tank 39 in turn is communicably connected by means of a pipe 41 and suitable elbow connections indicated at 42 with a vertical pipe 43 communicating in manner to be hereinafter described with the cover lifting and material feeding devices.

Referring now to Fig. 2, it will be noted that the shaft which carries the Geneva arm 23 has mounted thereon two cam members 44 and 45, which are oppositely formed and adapted to control container holding jaws 46 and 47, of which three pairs are provided upon each side of the conveyer path above the table. Each jaw 46 is adjustably mounted upon a lever 51 secured to a rock shaft 48 and each jaw 47 is similarly mounted upon a lever 52 secured to a rock shaft 49 and the levers 51 and 52 are respectively provided with cam roller arms 53 and 54 which are actuated by the cam members 44 and 45.

Each jaw 46 and 47 is in the form of a housing pivoted respectively at 46′ and 47′ to the respective levers 51 and 52 which extend into the said housing. An adjusting screw threaded into the upper end of the lever 51 or 52 as the case may be, bears against one of the inner surfaces of the shell of the jaw 46 or 47 and a locking screw threaded in the rear wall of the shell of the jaw 46 or 47 engages the upper end of the lever 51 or 52 and cooperates with the adjusting screw to adjustably but fixedly hold the jaw 46 to the lever 51 or the jaw 47 to the lever 52. By this construction it is possible to position each jaw 46 or 47 relative to the position of the respective levers 51 or 52 and at the same time after the position is properly attained the jaw 46 or 47 is securely locked to act as one unit with the lever 51 or 52, this being illustrated in Fig. 2ª. It will be manifest that rotation of the shaft 24 accomplishes intermittent opening and closing of the jaws 46 and 47, they being brought to closed position when the conveyor chain 15 and the containers controlled thereby are at rest.

The shaft 24 has mounted thereon a third grooved cam member 55 which actuates a bell crank lever 56 mounted upon a pin 57 and connected by a link 58 with an arm 59 rigidly secured to an operating shaft 61 upon which are fixed the three cover removing heads 62. Through the mechanism just described rotation of the shaft 24 automatically raises and lowers the heads 62 for the purpose of removing and replacing the covers or caps 63 which are loosely applied to the containers 64 when the latter are fed to position beneath said heads by the conveyer 15.

Fig. 9 illustrates diagrammatically the relation of the cams 44, 45 and 55 and shows by relation of the shape of the respective cam grooves, the movement of the clamping jaws 46 and 47, relative to the movement of the cover removing head 62. In this development the horizontal lines leading to the letters on the right-hand side of the figure indicate positions or zones of movement of the various parts actuated by the cams. For example, in viewing Fig. 9 from the top and moving downward, it should be noted that at the line "A" I start with the cam groove of the cam 55 holding its roller toward the right, which holds the cover removing head 62 in a vertical position, being up and away from the container 64. At this time the cam groove of cam 44 is holding the roller toward the left and the cam groove of cam 45 is holding the roller toward the right, thus holding their respective jaws 47 and 46 outward or away from the container 64. As movement of the cams about their shafts 24 continues from the position "A" to the position "B," the cam grooves 44 and 45 operating upon the jaws 47 and 46, close the jaws about the containers 64 and are brought into position at that time. At this position "B" the cam groove 55 has brought the cover removing head 62 downward into contact with the cap of the container 64. As rotation of the cam continues from "B" to "C," the cam 55 operates to raise the cover removing head 62 into vertical position and during this movement the jaws 46 and 47 remain closed about the container 64. Continued rotation of the cams from the position "C" to the position "D" has no effect or change of position upon the cover removing head 62 or the clamping jaws 46 and 47. During this time the filling action takes place. During the movement of the cams from "D" to "E," the cover removing head 62 is brought down by means of the action of the cam groove in the cam 55, and movement from "E" to "F" of the said cam, raises the cover removing head 62 and at the same time the cams 44 and 45 open the jaws 47 and 46. From "F" to "A" the cover removing head 62 remains upward and the jaws 46 and 47 remain outward. During this time the containers are moved from the machine and subsequent containers are put into position for the next cycle of movements.

The plate 89 is caused to normally assume the position shown in full lines in Fig. 7, wherein it closes the lower part of the meas-

uring chamber 91 by means of any suitable form of spring or weight 97', suspended on a rod 96 projected from the plate 89 adjacent the contact therewith of the link 97. As the parts are caused to assume the position illustrated in dotted lines by reason of the contact of the pin 88 against the hooked arm 96, the weight 97' is caused to be lifted. The three directing spouts 64' are pivoted on a horizontal shaft 65 suspended from directing hoppers 66 through which the salt passes, and the shaft 65 is connected by a link 67 with the arm 59 which is mounted on the head operating shaft 61. By this connection the spouts 64' are brought to vertical or operative position when the heads 62 are raised and are moved to the position shown in the drawings when said heads are lowered as shown in Figs. 1 and 2.

In order to cause the heads 62 to lift the caps from the containers, when they come in contact therewith, they are provided with suction means, and I have provided a vacuum control which is illustrated in detail in Fig. 3. A vertical passage 67 communicates at desired times with the vacuum tank 39, and a horizontal passage 68 extends from said passage 67 to a point above the center of the recessed part 69 of said head. At this point there is provided a valve 71 carried upon a stem 72, the lower end of which carries a plate 73 operable in a recess 74. It will thus be seen that when the head is lowered and the plate 73 is pressed down on a cover the valve 71 is lifted from its seat against the tension of a spring 75 and this establishes communication with a passageway 76 which in turn communicates with an annular channel 77 provided between annular members 78 slightly protruding from the recess 74 in the head. When a cover is not present on a container the plate 73 will enter within the edge of the container and not be raised, so that the application of the vacuum is dependent on the presence of the cover and is controlled thereby. The vacuum thus provided holds the cover in the head and when the latter is lifted said cover is removed and retained therein. The lifting of the head, as has been stated, brings the spouts 64' under the directing hoppers 66 and into registration with the open end of the container whereupon the salt is fed in manner to be next described.

A passage 79 in the upper part of the head leads from the valve opening 81 and a suitable connection 82 of a flexible or equivalent construction is provided between said passage and a cylinder 83 at the upper end of the frame, said cylinder being illustrated in detail in Fig. 6. When a vacuum is created in this cylinder a piston 84 is drawn to the right as viewed in Fig. 6, and carries therewith a collar 85 which is feathered to the shaft 86 and connected by means of a yoke 87 with said piston. Protruding from the collar 85 is a pin 88 which serves to actuate a bottom plate 89 of a measuring chamber 91 in a manner to be now described. The shaft 86 which carries the collar 85 is rotated through suitable gearing 92 driven by a shaft 93 carrying a sprocket 94 driven by a chain 95, providing a connection with the driven shaft 24 (Fig. 2). Rotation of said shaft 86 causes the pin 88 to strike a hooked arm 96 which is connected by a link 97 with the bottom or cut-off plate 89, and the resultant movement causes the parts to assume the position indicated in dotted lines in Fig. 7. It will be understood that the opening mechanism just described is provided for each chamber 91 A suitable clutch mechanism indicated by the reference character 98 (Fig. 1) is provided whereby the entire weighing and filling devices may be manually disconnected from the continuously rotating shaft 93. A suitable hand lever 99 is provided for the manual operation of the clutch 98.

The salt is fed to the measuring chambers 91 by means of weighing mechanism of well known form, which is merely diagrammatically illustrated, since it forms no part of the present invention. Suitable magazines or reservoirs 101 are provided above the measuring or weighing chambers 91, and a cut-off plate 102 is pivotally secured upon the lower part of each reservoir. Each measuring or weighing chamber 91 is secured upon a yoked member 103 (Fig. 2) which is pivoted or fulcrumed upon a sharp edge 104 and which carries at its opposite end a weight 105, the latter being adjustable to vary the weight of the salt fed in a single charge. The cut-off plate 102 is operated by suitable mechanism (not shown) and is controlled to close the passage from the reservoir 101 by the weight of the salt in the chamber 91. When the bottom plates 89 of said chambers are opened in the manner hereinbefore described, the salt passes through the directing hoppers 66 and into the open top containers.

After the containers have been filled the heads 62 are again lowered by the movement of the cam 55 and the vacuum in said heads and in the cylinder 83 is cut off and air pressure restored by mechanism illustrated in detail in Figs. 4 and 5. A horizontal portion 106 of the pipe leading from the vacuum tank communicates with an opening 107 in a valve casing 108 (Fig. 4). A valve 109 is seated in said casing upon a valve seat 111 and is spring pressed downwardly by means of a spring 112 surrounding the valve stem 113 which has a lower enlarged portion 114 extending through a bracket 115 and riding upon a cam 116 (Fig. 5) which is mounted upon the shaft 24 The cam 116 is so constructed that when the covers are replaced upon the containers the valve 109 is permitted to be seated, cutting off communication with the vacuum tank 39. At the same

time another valve 117 having a stem 118, secured by a pin 119 in the upper part of the valve 109, is opened, admitting atmosphere through a passage 121 into an upper pipe connection 122 which leads to the heads 62. In this manner atmospheric pressure is admitted to the channel 77 and the covers are released. Furthermore, pressure is communicated to the cylinder 83 causing the piston 84 to move toward the left, as viewed in Fig. 6, and disconnecting the hook 96 from the pin 88. The gate members 89 are thus closed and the apparatus is in condition for a subsequent cycle of operations.

It will be understood that continued operation of the conveyer 15 moves the filled containers away from the filling stations, and they may be transferred for further operation thereon, the next step being ordinarily the placing of a label over the top to secure it in place. The containers in the present instance are of the common variety provided with spouts 123, though it will be obvious that the invention is adaptable to the filling of a wide variety of packages.

It will be noted that the operative connection between the lifting heads and the cylinder 83 prevents the operation of the feed control plate 89 when no container is in position beneath the head or in case a container is not provided with a cover. In such event the valve 71 would not be operated and no communication between the cylinder 83 and the vacuum tank would be established and the piston 84 and mechanisms 88 and 96 would not be operated to move the closing plate 89.

With the foregoing construction it will be obvious that the measuring or weighing chambers 91 will be kept filled with salt since they are automatically filled, upon being emptied, by the weight control described. Also, the material may be fed at any time from the chambers through the directing hoppers and spouts into the containers when the latter are positioned in proper condition beneath the decapping and capping heads. The action is therefore automatic, being accomplished in proper sequence by the interrelated mechanism controlled by operation of the motor 36.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a machine for filling containers the combination of means for moving the containers to be filled intermittently along a defined path, jaws mounted at opposite sides of said path, means for closing said jaws to grasp the containers below the covers when the containers are at rest, swinging heads having suction means for lifting the covers of the containers, means for swinging the heads to cause the suction means to engage the covers and then to lift the covers from the containers, air-valve mechanism operated in time with the container-moving means and with said swinging heads to connect said suction means with a source of vacuum to lift the covers and with the atmosphere to release the covers, and means for filling the containers when the covers are raised.

2. In a machine for filling containers the combination of means for moving the containers to be filled intermittently along a defined path, jaws mounted at opposite sides of said path, means for closing said jaws to grasp the containers below the covers, when the containers are at rest, swinging heads having suction means for lifting the covers of the containers, means for swinging the heads to cause the suction means to engage the covers and then to lift the covers from the containers, air-valve mechanism operated in time with the container-moving means and with said swinging heads to connect said suction means with a source of vacuum to lift the covers and with the atmosphere to release the covers, means for filling the containers when the covers are raised, and means whereby the same source of vacuum also controls the supply of filling material to be delivered to the containers.

3. The combination of a can-conveyer, a cover-remover having a horizontal axis on which it is swingable upward from over the can, and having suction means for holding the cover and movable towards and from the plane of movement of said conveyer, means for holding the cans from moving away from the conveyer, and mechanism for operating said conveyer and cover-remover and suction means in timed relation.

4. Apparatus for filling containers having in combination container-conveying means, container-filling means, feeding devices, cut-off means for controlling the delivery of material to said filling means, suction heads for lifting and replacing the covers of the containers, suction means controlling the delivery of the material to the filling means and connected with said heads, and mechanism operating the conveying means, filling means, and suction heads in timed relation to each other.

5. Apparatus for filling containers with salt or the like, comprising in combination a reservoir for holding a predetermined charge of filling material, a filling station in alignment therewith and adapted to receive a container with a cover thereon, means, including a vacuum connection, and means for op-

erating the same, for removing the cover from the container before it is filled, for holding the cover while it is being filled and for replacing it after it is filled, said cover when present closing said vacuum connection and allowing a vacuum to be established therein, and means whereby the absence of the cover prevents discharge of material from said reservoir, and means for holding the container, at a point below the flange of the cover, from being lifted with the cover.

6. Apparatus for filling containers with salt or the like, comprising in combination a reservoir for holding the material to be filled, a filling station adapted to receive a container with a cover thereon, means, including a vacuum connection, and means for operating the same, for removing the cover from the container before it is filled, for holding the cover while it is being filled and for replacing it after it is filled, said vacuum connection being closed by the cover, and means for opening said vacuum connection, and means for holding the container at a point below the cover flange while the cover is being removed.

7. Apparatus for filling containers with salt or the like, comprising in combination, means for intermittently advancing containers to be filled, means for automatically clamping the containers in filling position, vacuum means cooperating with said advancing means for lifting the covers from said containers and for automatically filling the latter, said vacuum means also automatically restoring the covers to closing position, said advancing means thereafter automatically discharging the filled containers, and mechanism for operating the advancing means and clamping means and vacuum means in timed relation to each other.

8. Apparatus for filling containers with salt or the like, comprising in combination, an intermittent conveyer for advancing the containers, vacuum means for decapping and recapping said containers, means for filling the containers while decapped, and mechanism for operating all of said means in timed relationship.

9. Apparatus for filling containers with salt or the like, comprising in combination, an automatic pivoted and swinging vacuum lifting head for removing and replacing a container cover and swingable with said cover from over the container, salt feeding mechanism for filling the container while the cover is removed, and operating mechanism having operative connections with said lifting head and feeding mechanism for operating them in the sequence set forth.

10. Apparatus for filling containers with salt or the like, comprising in combination, an automatic pivoted and swinging lifting head swingable to one side of the container for removing and replacing a container cover, salt feeding mechanism for filling the container while the cover is removed, a filling spout having connections and movable with the lifting head, and operating mechanism having operative connections with said lifting head and feeding mechanism and spout for operating them in the sequence set forth.

11. Apparatus for filling containers with salt or the like which comprises in combination, a chamber adapted to contain a measured charge of filling material, a filling station positioned therebeneath and adapted to receive a container with a cover applied thereto, a cover removing device with vacuum holding means therein for withdrawing the cover from said container, a filling device having connections with and movable with said cover removing device for conducting said filling material from said chamber into said container, said cover removing device also replacing the cover onto said filled container, and mechanism for moving said removing device.

12. Apparatus for filling containers with salt or the like comprising in combination, a chamber adapted to contain a measured charge of filling material, a filling station in alignment therewith and adapted to receive a container with a cover applied thereto, a cover removing device with vacuum holding means therein for withdrawing the cover from said container, a filling device connected with said vacuum holding means for releasing said measured charge and adapted to be actuated when a cover is present and to remain unaffected in the absence of a cover, and means for so actuating the filling device, said cover removing device also replacing the cover upon the filled container, and operating mechanism having operative connections with said removing device and with said filling device.

13. Apparatus for filling containers with salt or the like, comprising in combination an intermittent can conveyer, a plurality of means for simultaneously decapping and recapping a plurality of cans, corresponding automatic means for simultaneously filling the open cans and devices for causing the conveyer to be arrested after the passage of a number of cans equal to the number of decapping and recapping means.

14. Apparatus for filling containers with salt or the like, comprising in combination can feeding mechanism, automatic clamping jaws for holding below the cover the cans in filling position, a cover removing and replacing member provided with vacuum means for automatically removing the cover when a can is fed to filling position, co-acting means for automatically filling the can while the cover is removed, and means for breaking the vacuum to release the cover when replaced upon the can, and mechanism for operating said mechanism and jaws and cover-moving member and vacuum means and filling means

and vacuum-breaking means in timed relation to each other.

15. Apparatus for filling containers with salt or the like, comprising in combination can feeding mechanism, automatic clamping jaws for holding the cans in filling position, a cover removing and replacing member provided with vacuum means for automatically removing the cover when a can is fed to filling position, co-acting vacuum controlled means for automatically filling the can while the cover is removed, and means for breaking the vacuum in said parts to permit release of the replaced cover and to close the salt feeding devices.

16. In a can filling machine, mechanism for temporarily removing a can cover to permit filling of a can and for thereafter replacing said cover, said mechanism comprising a lifting head, means for automatically controlling said head to position it upon and remove it from a can, and means for producing a vacuum in said head to cause it to lift a cover, said last mentioned means comprising an air exhaust passage and a valve therein operable by the cover.

17. Apparatus for filling containers having in combination container-conveying means, container-filling means, and vacuum means for removing and replacing the covers of the containers, said vacuum means having a vacuum-controlling element which is actuated to apply the vacuum by the covers of the containers, and mechanism operating said conveying means and filling means and cover-moving means in timed relation to each other.

18. Apparatus for filling containers having in combination container-conveying means, container-filling means comprising a movable spout delivering to the conveyed containers, means for removing and replacing the covers of the containers respectively before and after said delivery, and connections whereby said spout is moved to filling position when said removing means has removed the cover of a container.

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